What is claimed is:

1. A method of compensating for distortion at an edge of an image during image processing, said method comprising:

detecting the edge in the image; and

sharpening the detected edge, wherein the degree of sharpening is directly proportional to a degree of distortion in the image.

2. A method according to claim 1, wherein the step of detecting an edge in the image includes:

defining a first context and a second context for two adjacent pixels in the image, wherein said two adjacent pixels comprise a first pixel and a second pixel, and wherein said first context comprises a set of pixels located immediately adjacent to said first pixel in a first direction, and said second context comprises a set of pixels located immediately adjacent to the second pixel in a second direction;

measuring an average intensity value of the first context and an average intensity value of the second context;

computing a difference value by subtracting the average intensity value of the first context from the average intensity value of the second context;

determining whether the first and second pixel comprise an edge by examining the difference value.

3. A method according to claim 2, wherein the step of determining whether the first and second pixel comprise an edge includes:

establishing a first threshold value and a second threshold value, wherein the second threshold value is greater than or equal to the first threshold value;

calculating a magnitude value by taking the square of the difference value;

comparing the magnitude value to the first threshold value and the second threshold value;

assigning a gain value based upon the magnitude value.

4. A method according to claim 3, wherein the gain value is set as zero if the magnitude value is less than both the first and second threshold level, the gain value is set as a positive number if the magnitude value is between the first threshold value and the second threshold value, and the gain value is set as a negative number if the magnitude value is greater than the second threshold value.

5. A method according to claim 4, wherein the step of sharpening includes adjusting the value of the first pixel and the second pixel in opposite direction, wherein

the first pixel is adjusted by adding to the first pixel value the product of the gain value multiplied by the difference value, and subsequently subtracting the product of a previous gain value and a previous difference value for a pixel pair that precedes the first pixel in the first direction; and

the second pixel is adjusted by subtracting from the second pixel value the product of the gain value multiplied by the difference value, and subsequently adding the product of the previous gain value and the previous difference value.

6. A method according to claim 3 wherein the first context and the second context are four pixels wide.

7. A method according to claim 3 wherein the first context overlaps and includes the first pixel and the second context overlaps and includes the second pixel.

8. A method according to claim 3 wherein the first context is contiguous with the first context and the second context is contiguous with the second pixel.

9. A method according to claim 3, wherein:
the first pixel is a left pixel;
the second pixel is a right pixel;
the first direction is to the left of the two adjacent pixels;
the second direction is to the right of the two adjacent pixels;

10. A method according to claim 3, wherein:
the first pixel is a top pixel;
the second pixel is a bottom pixel;
the first direction is above the two adjacent pixels;
the second direction is below the two adjacent pixels;

11. A method of sharpening edges within an image during image processing, said method comprising:

detecting an edge in the image, said edge being characterized by an area of high contrast between an area of low intensity and an area of high intensity in the image; and

applying a filter to the image at the detected edge, wherein said filter adjusts the intensity of pixel values near an edge in order to compensate for a blurring effect that occurs at the edges during scanning of the image.

12. A method according to claim 11, wherein the filter also compensates for a distortion that occurs during printing of the image.

13. A method according to claim 11, wherein the step of applying a filter comprises:

applying a negative gain to the area of low intensity that is adjacent to the edge; and

applying a positive gain to the area of high intensity that is adjacent to the edge;

wherein said filter has an effect of increasing contrast between the area of low intensity and the area of high intensity while maintaining a constant average intensity level.

14. A method according to claim 11, wherein the step of applying the filter comprises:

applying a first negative gain and a first positive gain to the area of low intensity that is adjacent the edge; and

applying a second negative gain and a second positive gain to the area of high intensity that is adjacent the edge;

wherein said filter has an effect of increasing contrast at the edge and providing detail to the edge while maintaining a constant average intensity level.

15. A method of sharpening edges according to claim 14, wherein:

the first negative gain is applied to decrease intensity in a first area within the area of low intensity, said first area being the area of low intensity that directly borders the area of high intensity;

the first positive gain is applied to slightly increase intensity in a second area that is within the area of low intensity, said second area being located between a non-edge area of the image and said first area;

the second positive gain is applied to increase intensity in a third area, said third area being the area of high intensity that directly borders the first area;

the second negative gain is applied to slightly decrease intensity in a fourth area, said fourth area being located within the area of high intensity between a non-edge area of the image and the third area.

16. A method of sharpening edges within an image during image processing, said method comprising:

detecting an edge in the image, said edge being characterized by an area of contrast between an area of low intensity and an area of high intensity in the image;

applying a filter to the image at the detected edge, whereby said filter adjusts the intensity of pixel values near the edge to compensate for error that occurs during printing of the image.

17. A method according to claim 16, wherein the step of applying a filter comprises:

applying a negative gain to the area of low intensity that is adjacent to the edge; and

applying a positive gain to the area of high intensity that is adjacent to the edge;

wherein said filter has an effect of increasing the contrast between the area of low intensity and the area of high intensity while maintaining a constant average intensity level.

18. A method according to claim 16, wherein the step of applying the filter comprises:

applying a first negative gain and a first positive gain to the area of low intensity that is adjacent the edge; and

applying a second negative gain and a second positive gain to the area of high intensity that is adjacent the edge;

wherein said filter has an effect of increasing the contrast at the edge and providing detail to the edge while maintaining a substantially constant average intensity level.

19. A method of sharpening edges according to claim 18, wherein:

the first negative gain is applied to decrease intensity in a first area within the area of low intensity, said first area being the area of low intensity that directly borders the area of high intensity;

the first positive gain is applied to slightly increase intensity in a second area that is within the area of low intensity, said second area being located between a non-edge area of the image and said first area;

the second positive gain is applied to increase intensity in a third area, said third area being the area of high intensity that directly borders the first area;

the second negative gain is applied to slightly decrease intensity in a fourth area, said fourth area being located within the area of high intensity between a non-edge area of the image and the third area.

20. A method of sharpening edges within an image during image processing, said method comprising:

defining a window of pixels within the image, said window comprising a first pixel, a first set of context pixels located immediately adjacent to said first pixel in a first direction, a second pixel located immediately adjacent to said first pixel in a

second direction, and a second set of context pixels located immediately adjacent to the second pixel in the second direction;

detecting an edge within the window of pixels, said edge being characterized by an area of high contrast between pixels of low intensity and pixels of high intensity;

sharpening the detected edge;

shifting the window in a linear direction in order to detect and sharpen additional edges of the image.

21. A method of sharpening edges according to claim 20, wherein the sharpening is applied only at detected edges of the image, while smooth transition areas of the image remain unaffected.

22. A method of sharpening edges according to claim 20, wherein the step of detecting an edge comprises:

measuring an average intensity value of the first set of context pixels and an average intensity value of the second set of context pixels;

computing a difference value by subtracting the average intensity value of the first set of context pixels from the average intensity value of the second set of context pixels;

determining whether the first pixel and second pixel comprise an edge by examining the difference value.

23. A method according to claim 22, wherein the step of determining whether the first and second pixel comprise an edge includes:

establishing a first threshold value and a second threshold value, wherein the

second threshold value is greater than or equal to the first threshold value;

calculating a magnitude value by taking the square of the difference value;

comparing the magnitude value to the first threshold value and the second threshold value;

assigning a gain value based upon the magnitude value.

24. A method according to claim 23, wherein the gain value is set as zero if the magnitude value is less than both the first and second threshold level, the gain value is set as a positive number if the magnitude value is between the first threshold value and the second threshold value, and the gain value is set as a negative number if the magnitude value is greater than the second threshold value.

25. A method according to claim 24, wherein the step of sharpening includes adjusting the value of the first pixel and the second pixel in opposite directions, wherein

the first pixel is adjusted by adding to the first pixel value the product of the gain value multiplied by the difference value, and subsequently subtracting the product of a previous gain value and a previous difference value for a pixel pair that precedes the first pixel in the first direction; and

the second pixel is adjusted by subtracting from the second pixel value the product of the gain value multiplied by the difference value, and subsequently adding the product of the previous gain value and the previous difference value.

26. A method according to claim 25, wherein:

the first pixel is a left pixel;

the second pixel is a right pixel;

the first direction is to the left of the first pixel;

the second direction is to the right of the second pixel; and wherein

the step of shifting the window comprises shifting the window by one pixel from left to right in order to sharpen non-horizontal edges in the image.

27. A method according to claim 25, wherein:

the first pixel is a top pixel;

the second pixel is a bottom pixel;

the first direction is above the top pixel;

the second direction is below the bottom pixel; and wherein

the step of shifting the window comprises shifting the window by one pixel from the top of the image to the bottom of the image in order to sharpen non-vertical edges in the image.

28. An electronic device comprising:

a scanner for scanning an original image and converting the image into a digital image signal comprised of pixels having an intensity value that ranges from a minimum intensity to a maximum intensity;

a printer for printing a copy of the original image onto a print medium by converting the image signal to a half-tone image using an error diffuser to sequentially process the pixels;

a digital signal processor for processing the image signal after scanning and before printing, wherein said digital signal processor includes a filter for sharpening edges of the image in order to compensate for distortion of the edges that occurs during scanning and printing of the image.

29. An electronic device according to claim 28, wherein the filter includes:

means for detecting an edge in the image, wherein the edge is characterized by a

sharp contrast in the image signal between pixels of low intensity and pixels of high intensity;

means for sharpening the edge by adjusting the image signal according to the degree of distortion in the image signal;

wherein said means for detecting and means for sharpening are implemented through a computer executable program stored in the digital signal processor.

30. An electronic device according to claim 29, wherein the filter adjusts the image signal by adding a negative gain to the pixels of low intensity that are adjacent to the edge and a positive gain to the pixels of high intensity that are adjacent to the edge, in order to increase the contrast between the pixels of low intensity and the pixels of high intensity while maintaining an substantially average intensity value for the image.

31. An electronic device according to claim 29, wherein the filter adjusts the image signal by adding a first positive gain and a first negative gain to the pixels of low intensity that are adjacent to the edge and a second positive gain and a second negative gain to the pixels of high intensity that are adjacent to the edge in order to increase the contrast and provide detail to the edge while maintaining an average intensity value for the image.

32. An electronic device according to claim 31, wherein:

the first negative gain is applied to decrease intensity in a first area of pixels within the pixels of low intensity, said first area comprising the pixels of low intensity that directly border the pixels of high intensity;

the first positive gain is applied to slightly increase intensity in a second area of pixels within the pixels of low intensity, said second area comprising pixels located between a non-edge area of the image and said first area;

the second positive gain is applied to increase intensity in a third area, said third area comprising pixels of high intensity that directly border the first area;

the second negative gain is applied to slightly decrease intensity in a fourth area, said fourth area comprising pixels of high intensity located between a non-edge area of the image and the third area.

33. An electronic device according to claim 29, wherein the filter forces the error diffuser in an edge region to place a dot in the area of high intensity only and prevents the placement of a dot in the area of low intensity.

34. The electronic device of claim 29, wherein the electronic device is a facsimile machine.

35. The electronic device of claim 29, wherein the electronic device is a photocopier.